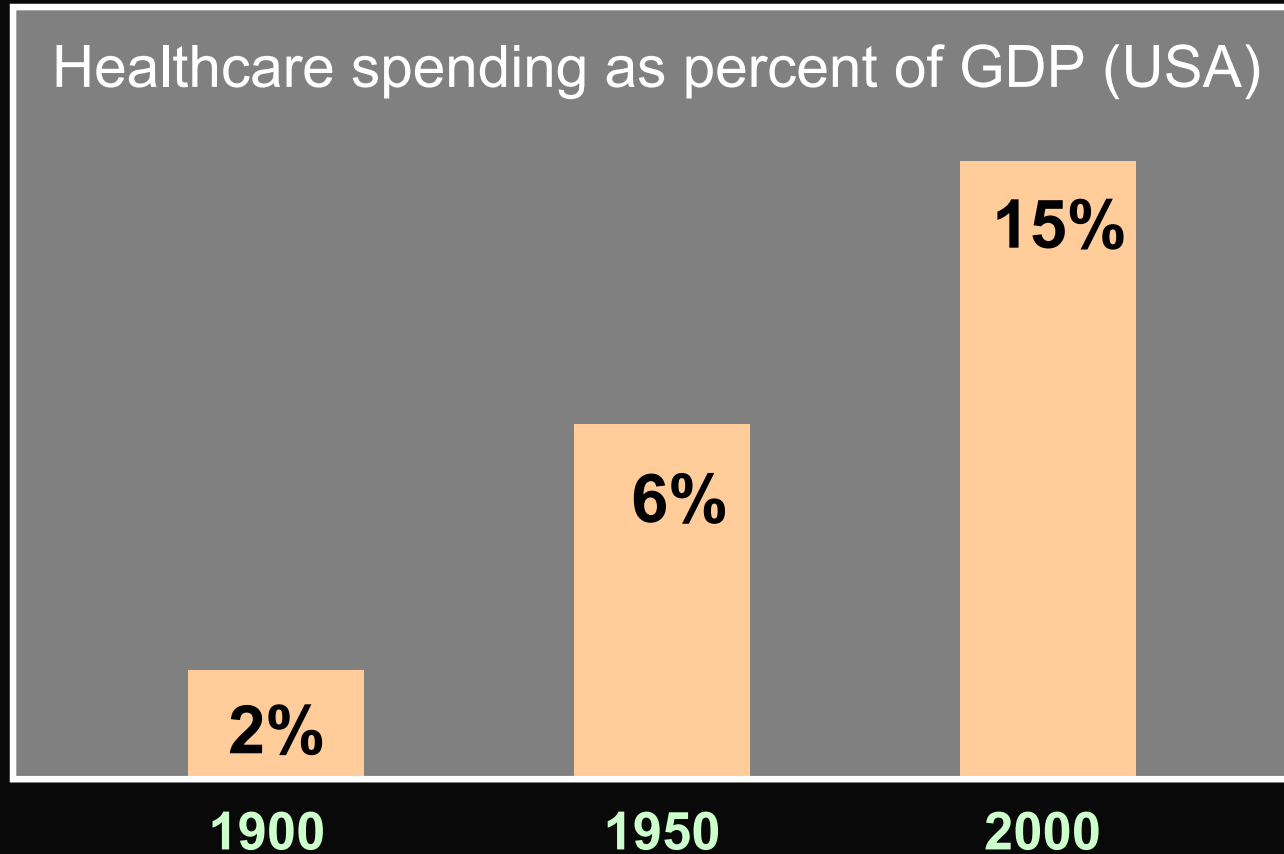


Careers in Biomedical Engineering

16 October 2003



The “Healthcare Economy”



Per Capita Healthcare spending (USA) will increase by >10% in 2002 and is expected to be over 20% of GDP by 2025



22 May 2000

What Will Be the 10 Hottest Jobs?

Looking for a career change? A decade ago, who would have guessed that Web designer would be one of the hottest jobs of 2000? Here are some clues.

1 TISSUE ENGINEERS - With man-made skin already on the market and artificial cartilage not far behind, 25 years from now scientists expect to be pulling a pancreas out of a Petri dish. Or trying, anyway. Researchers have successfully grown new intestines and bladders inside animals' abdominal cavities, and work has begun on building liver, heart and kidney tissue.

FAQ's

- What sorts of companies hire biomedical engineers?
- Should I plan on getting a PhD?
- What is a typical career path in industry?
- How do I find my first job?
- What are salaries like?
- What characteristics are companies looking for?
- What are some of the tradeoffs between academia and industry

Employers

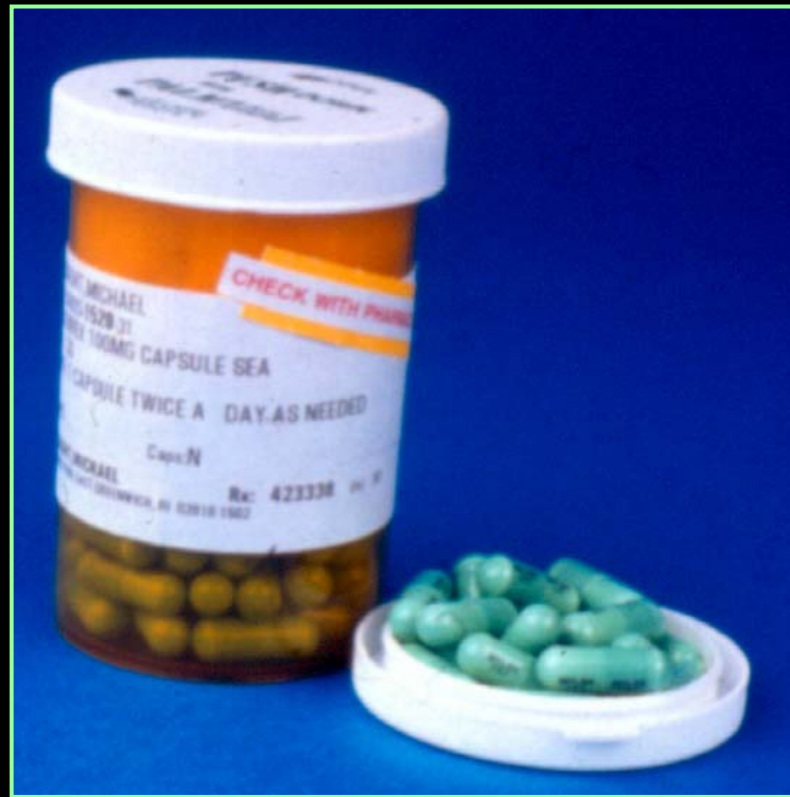
Three kinds of companies

- **Pharmaceuticals:** *Prozac, Lipitor, tylenol*
- **Medical Device:** *pacemakers, dialyzers, CAT's*
- **Biologics:** *vaccines, factor VIII, stem cells*

Which have an aggregate domestic business volume of over 800 billion dollars, employ over 4 million workers, and are growing at 5 to 10% per year

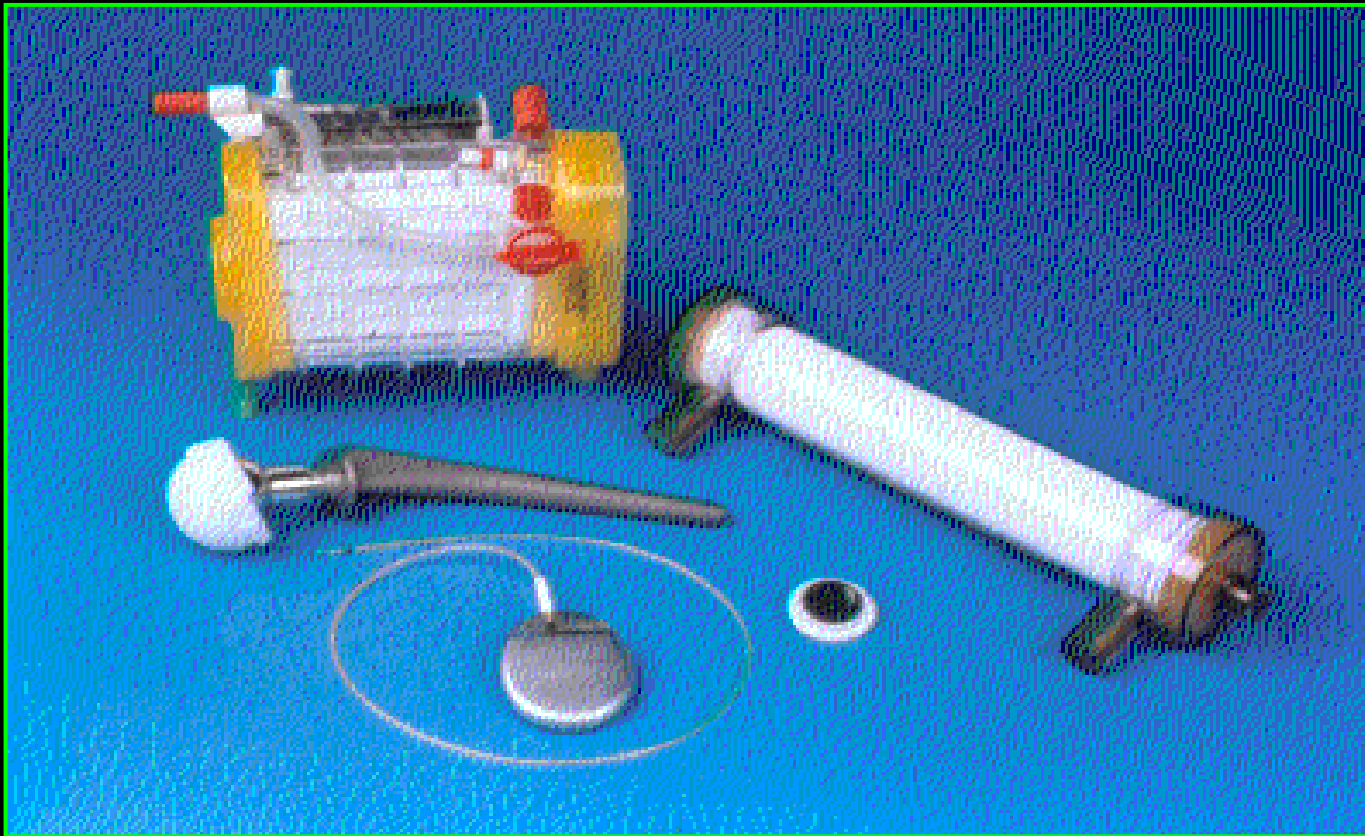
Related industries suitable for biomedical engineers include financial services; patent, regulatory and product-liability law; medicine; clinical specialists; advertising; and education

Pharmaceutical Products



Just imagine life without them

Medical Devices



*Therapies enabled by “artificial organs”
account for ~8% of contemporary medicine*

If I am interested in a career in biomedical engineering, should I get a PhD?

- YES, YES, YES,
- Unless you are interested in positions whose content is primarily non-technical (sales, human resources)
- But it is OK too work for a few years and then come back for the PhD (or MBA)
- Post doc's don't hurt, but aren't necessary

Typical Career Path: I

Going in positions:

- Bench level or project-level research programs, working under the close supervision of more senior engineers or scientists. Starting PhD's typically have an office, technician support, and their own lab space.

After 3-8 years, engineers:

- Continue in laboratory and project work at the level of senior scientist or independent investigator
- Become involved in technology management, often rotating through other areas (regulatory, marketing, documentation, clinical liaison etc)

After another 3-8 years

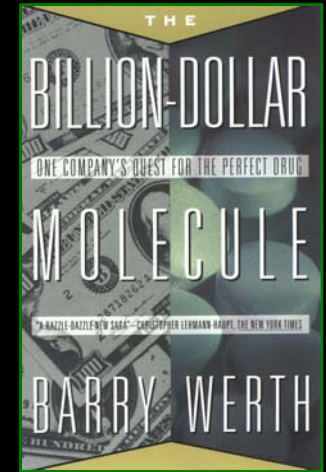
- The pack begins to spread out, and individuals identify as managers, scientific leaders, or broad-based support personnel

Typical Career Path: II

- Expect to change jobs every 5 to 10 years and work for 7-8 companies during your career
- Consider taking one “pre-industry” course at Brown
 - En 193-94 Entrepreneurship
 - Bi-008 Biotechnology Management
 - EN-009 Management of Organizations
 - EN-90/90 Managerial Decision Making
 - SO-106 Leadership in Organization s

Small companies

< 100 employees & especially startups

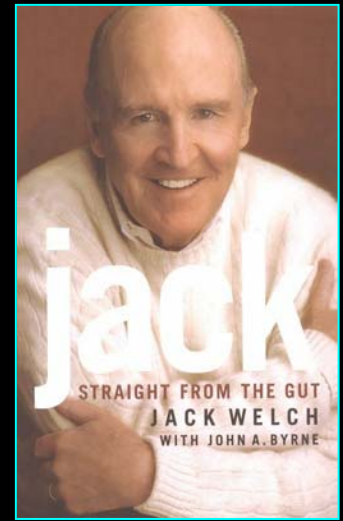


To dig deeper

- Greater opportunity for career advancement and range of experiences
- Long hours
- Fewer creature comforts
- Equity participation can lead to accumulation of wealth
- Resource-constraints and very real risk of company going belly up

Large Companies

Billion Dollar Plus



To dig deeper

- Little risk of company failure
- More structured career paths
- Greater resource availability
More opportunities for travel and relocation (including overseas)
- Tendency toward formality and hierarchy
- Easier to get lost in back

Small vs large is not a one-off decision. It is certainly possible to go back and forth

Finding a job

- It's a match-up thing. Companies will need you as much as you need them but the process is frustrating because recruitment is very inefficient. Downsizing has cut "human resources" to the bare bone
- Be optimistic. The Biopharmaceutical industry is growing at 10% per year and there is a real shortage of qualified biomedical engineers. Biomedical engineering jobs are growing at twice the rate of all engineering positions
- In general, you have to find jobs, they don't find you
- Pursue all avenues

***A Surprising number of jobs come about through serendipity ..
But serendipity most often happens when you make it happen***

Pursuing all avenues

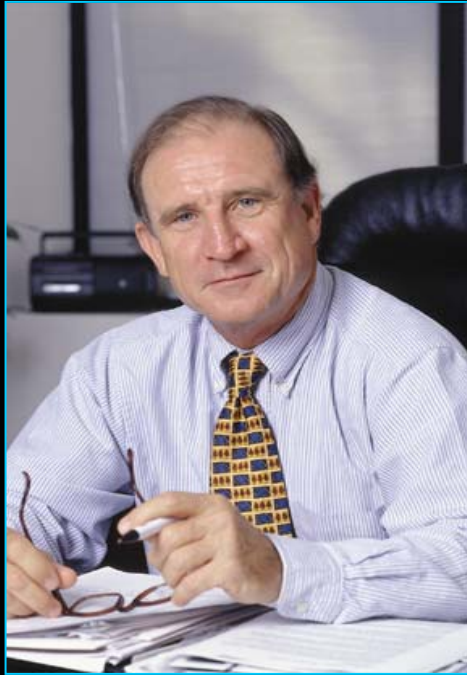
Begin by

- being clear in your own priorities
- preparing a spiffy one-page CV (resume)

The go after

- Personal contacts, including family and friends
- The web. Virtually every company now has a website with employment opportunity sections. Lists of companies are available at Advamed, PhMRA,
- Ads in the Back of *Science*, *Nature*, *C&E News*, *Sunday NY Times*, *Boston Globe* + Regional papers
- Brown's Career Services, *next presentation*

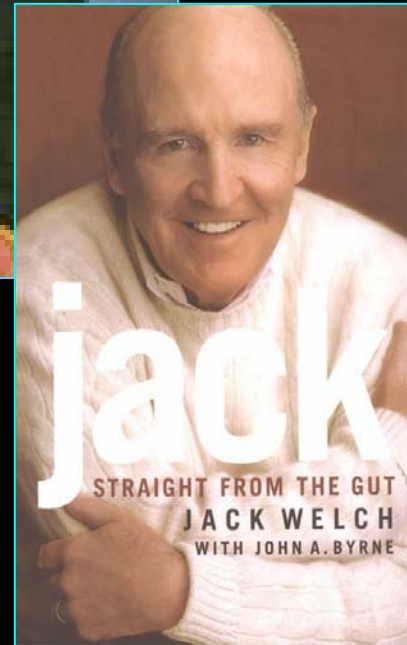
Some Success Stories



Peter C Farrell



Mark Levin



What individual characteristics correlate with success in the biomedical engineering industries?

- Integrity
- Intelligence
- Presence
- Communication ability
- Disciplined work habits
- Group process skills

Industry vs Academia

- Academics offers more freedom to pursue personal interests (“do what you want to do”) whereas industry wants employees to “do what needs to be done” for the company.
- Universities provide a more diverse intellectual environment plus “the joy of teaching and the wonder of learning”
- University positions are tenured, whilst industry considers downsizing a virtue
- Industry salaries are higher and perks, creature comforts, support services, and perks are much better
- Policies and management style are more rational, or at least more market-responsive, in industry

